What is claimed is:

1. A resin with lowered polydispersity index, comprising the reaction product of the following reactants:

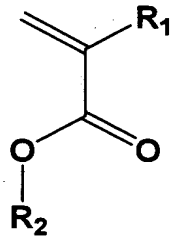
at least two different acrylate monomers;

at least one initiator; and

at least one chain transfer reagent,

wherein the reaction product has a polydispersity index of 1.5 or less.

2. The resin as claimed in claim 1, wherein the acrylate monomer has a formula (I), of.



wherein

R_1 is a hydrogen atom, a fluorine atom, a halogen atom, cyano group, saturated or unsaturated alkyl group, amino group, cycloalkyl group, heterocycloalkyl group, polycyclic alkyl group, aryl group, heteroaryl group, arylalkyl group, or alkylaryl group, wherein the saturated or unsaturated alkyl group is straight or branched and has 1 to 12 carbon atoms;

R_2 is a hydrogen atom, saturated or unsaturated alkyl group, cycloalkyl group, heterocycloalkyl group, polycyclic alkyl group, adamantyl group, aryl group, heteroaryl group, arylalkyl group, or

alkylaryl group, wherein the saturated or unsaturated alkyl group is straight or branched and has 1 to 12 carbon atoms; and

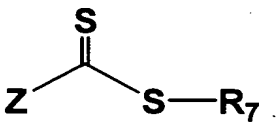
optionally at least one hydrogen atom bonded to the carbon atom of the acrylate monomer according to formula (I) is substituted by a fluorine atom, a halogen atom, cyano group, -R", $-CO_2H$, $-CO_2R"$, $-R"CO_2H$, -COR", -R"CN, $-CONH_2$, -CONHR", $-CONR"_2$, -OCOR", or -OR", wherein R" is saturated or unsaturated alkyl group having 1 to 12 carbon atoms, thioalkyl group, alkynyloxy group, heterocycloalkyl group, alkoxy group, ester group, alkenyl group, alkynylene group, alkenyloxy group, heterocycloalkyl group, aryl group, arylalkyl group, alkylaryl group, heteroaryl group, or combinations thereof, provided that when R" has hydrogen atom bonded to the carbon, optionally at least one hydrogen atom bonded to the carbon atom of R" is substituted by a fluorine atom, or halogen atom.

3. The resin as claimed in claim 1, wherein the initiator is an agent generating free radical species through decomposition.

4. The resin as claimed in claim 1, wherein the initiator is peroxide initiators, azo initiators, or combinations thereof.

5. The resin as claimed in claim 1, wherein the chain transfer reagent is a reversible addition-fragmentation chain transfer reagent.

6. The resin as claimed in claim 1, wherein the chain transfer reagent is a reversible addition-fragmentation chain transfer reagent according to formula (III), of



wherein

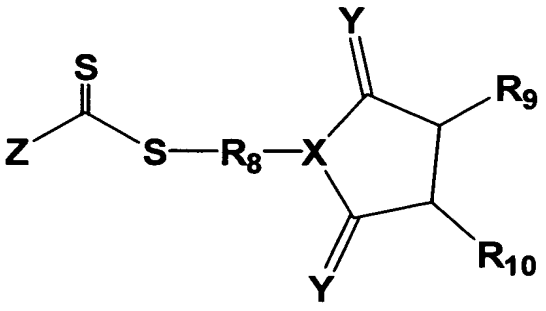
Z is a hydrogen atom, a fluorine atom, a halogen atom, cyano group, saturated or unsaturated alkyl group, amino group, cycloalkyl group, heterocycloalkyl group, polycyclic alkyl group, aryl group, heteroaryl group, arylalkyl group, alkylaryl group, heteroalkylaryl group, $-CO_2H$, $-CO_2R"$, $-R"CO_2H$, $-COR"$, $-CONH_2$, $-CONHR"$, $-CONR"_2$, $-OCOR"$, $-OR"$, $-SR"$, $-NR"_2$, or $-POR"_2$, wherein R" is saturated or unsaturated alkyl group having 1 to 12 carbon atoms, thioalkyl group, alkynyloxy group, heterocycloalkyl group, alkoxy group, ester group, alkenyl group, alkynylene group, alkenyloxy group, heterocycloalkyl group, aryl group, arylalkyl group, alkylaryl group, heteroaryl group, or combinations thereof;

R_7 is a hydrogen atom, a fluorine atom, a halogen atom, cyano group, saturated or unsaturated alkyl group, amino group, cycloalkyl group, heterocycloalkyl group, polycyclic alkyl group,

aryl group, heteroaryl group, arylalkyl group, or alkylaryl group, wherein the saturated or unsaturated alkyl group is straight or branched and has 1 to 12 carbon atoms; and

optionally at least one hydrogen atom bonded to the carbon atom of the RAFT reagent according to formula (III) is substituted by a fluorine atom, a halogen atom, cyano group, -R", $-CO_2H$, $-CO_2R"$, -R"CO_2H, -COR", -R"CN, $-CONH_2$, -CONHR", $-CONR"_2$, -OCOR", or -OR", wherein R" is saturated or unsaturated alkyl group having 1 to 12 carbon atoms, thioalkyl group, alkynyloxy group, heterocycloalkyl group, alkoxy group, ester group, alkenyl group, alkynylene group, alkenyloxy group, heterocycloalkyl group, aryl group, arylalkyl group, alkylaryl group, heteroaryl group, or combinations thereof, provided that when R" has hydrogen atom bonded to the carbon, optionally at least one hydrogen atom bonded to the carbon atom of R" is substituted by a fluorine atom, or halogen atom.

7. The resin as claimed in claim 1, wherein the chain transfer reagent is a reversible addition-fragmentation chain transfer reagent according to formula (IV), of



wherein

Z is a hydrogen atom, a fluorine atom, a halogen atom, cyano group, saturated or unsaturated alkyl group, amino group, cycloalkyl group, heterocycloalkyl group, polycyclic alkyl group, aryl group, heteroaryl group, arylalkyl group, alkylaryl group, heteroalkylaryl group, $-CO_2H$, $-CO_2R"$, $-R"CO_2H$, $-COR"$, $-CONH_2$, $-CONHR"$, $-CONR"_2$, $-OCOR"$, $-OR"$, $-SR"$, $-NR"_2$, or $-POR"_2$, wherein R" is saturated or unsaturated alkyl group having 1 to 12 carbon atoms, thioalkyl group, alkynyloxy group, heterocycloalkyl group, alkoxy group, ester group, alkenyl group, alkynylene group, alkenyloxy group, heterocycloalkyl group, aryl group, arylalkyl group, alkylaryl group, heteroaryl group, or combinations thereof;

R_8 is saturated or unsaturated alkyl group having 1 to 12 carbon atoms, thioalkyl group, alkoxy group, alkenyl group, alkynylene group, alkenyloxy group, alkynyloxy group, or combinations thereof;

R_9 and R_{10} are the same or different and are a hydrogen atom, a fluorine atom, a halogen atom, cyano group, saturated or unsaturated alkyl group,

amino group, cycloalkyl group, heterocycloalkyl group, polycyclic alkyl group, aryl group, heteroaryl group, arylalkyl group, or alkylaryl group, wherein the saturated or unsaturated alkyl group is straight or branched and has 1 to 12 carbon atoms;

X is N or -CH;

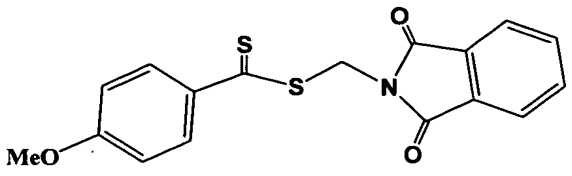
Y is O or S; and

optionally at least one hydrogen atom bonded to the carbon atom of the RAFT reagent according to formula (IV) is substituted by a fluorine atom, a halogen atom, cyano group, -R", $-CO_2H$, $-CO_2R"$, $-R"CO_2H$, -COR", -R"CN, $-CONH_2$, -CONHR", $-CONR"_2$, -OCOR", or -OR", wherein R" is saturated or unsaturated alkyl group having 1 to 12 carbon atoms, thioalkyl group, alkynyloxy group, heterocycloalkyl group, alkoxy group, ester group, alkenyl group, alkynylene group, alkenyloxy group, heterocycloalkyl group, aryl group, arylalkyl group, alkylaryl group, heteroaryl group, or combinations thereof, provided that when R" has a hydrogen atom bonded to the carbon, optionally at least one hydrogen atom bonded to the carbon atom of R" is substituted by a fluorine atom, or halogen atom.

8. The resin as claimed in claim 7, wherein the R_9 and R_{10} are jointly constructed of cycloalkyl group, heterocycloalkyl group, cycloalkenyl group, arylalkyl group,

alkylaryl group, heteroaryl group, or polycyclic alkyl group.

9. The resin as claimed in claim 1, wherein the chain transfer reagent is



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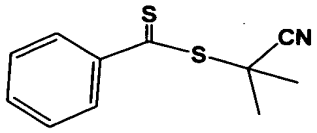

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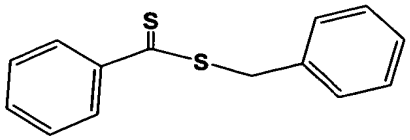

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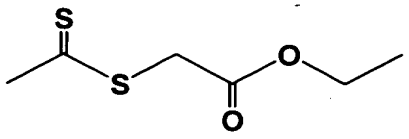


, or combinations thereof,

wherein

optionally at least one hydrogen atom bonded to the carbon atom of the chain transfer reagent is substituted by a fluorine atom, a halogen atom, cyano group, -R", $-CO_2H$, $-CO_2R"$, $-R"CO_2H$, -COR", -R"CN, $-CONH_2$, -CONHR", $-CONR"_2$, -OCOR" ,or -OR", wherein R" is saturated or unsaturated alkyl group having 1 to 12 carbon atoms, thioalkyl group, alkynyloxy group, heterocycloalkyl group, alkoxy group, ester group, alkenyl group, alkynylene group, alkenyloxy group, heterocycloalkyl group, aryl group, arylalkyl

group, alkylaryl group, heteroaryl group, or combinations thereof, provided that when R" has hydrogen atom bonded to the carbon, optionally at least one hydrogen atom bonded to the carbon atom of R" is substituted by a fluorine atom, or halogen atom.

10. The resin as claimed in claim 1, wherein the reaction product has an average molecular weight from 2000 to 30000.

11. A resin with lowered polydispersity index, comprising the reaction product of the following reactants:

at least one norbornene monomer in a ratio from 1ppm to 100wt%;

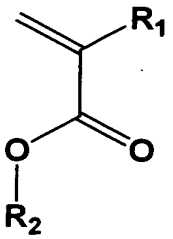
at least one acrylate monomer, in a ratio from 0wt% to 99.99999wt%, based on the weight of at least one norbornene monomer and at least one acrylate monomer;

at least one initiator; and

at least one chain transfer reagent,

wherein the reaction product has a polydispersity index of 1.5 or less.

12. The resin as claimed in claim 11, wherein the acrylate monomer has a formula (I), of:



wherein

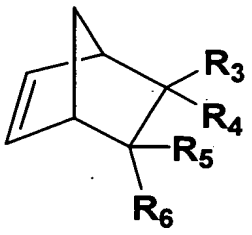
R_1 is a hydrogen atom, a fluorine atom, a halogen atom, cyano group, saturated or unsaturated alkyl group, amino group, cycloalkyl group, heterocycloalkyl group, polycyclic alkyl group, aryl group, heteroaryl group, arylalkyl group, or alkylaryl group, wherein the saturated or unsaturated alkyl group is straight or branched and has 1 to 12 carbon atoms;

R_2 is a hydrogen atom, saturated or unsaturated alkyl group, cycloalkyl group, heterocycloalkyl group, polycyclic alkyl group, adamantyl group, aryl group, heteroaryl group, arylalkyl group, or alkylaryl group, wherein the saturated or unsaturated alkyl group is straight or branched and has 1 to 12 carbon atoms; and

optionally at least one hydrogen atom bonded to the carbon atom of the acrylate monomer according to formula (I) is substituted by a fluorine atom, a halogen atom, cyano group, -R", $-CO_2H$, $-CO_2R"$, $-R"CO_2H$, -COR", -R"CN, $-CONH_2$, -CONHR", $-CONR"_2$, -OCOR", or -OR", wherein R" is saturated or unsaturated alkyl group having 1 to 12 carbon atoms, thioalkyl group, alkynyloxy group, heterocycloalkyl group, alkoxy group, ester group, alkenyl group, alkynylene group, alkenyloxy group, heterocycloalkyl group, aryl group, arylalkyl group, alkylaryl group, heteroaryl group, or combinations thereof, provided that when R" has hydrogen atom bonded to

the carbon, optionally at least one hydrogen atom bonded to the carbon atom of R" is substituted by a fluorine atom, or halogen atom.

13. The resin as claimed in claim 11, wherein the norbornene monomer has a formula (II), of:



wherein

R_3, R_4, R_5, and R_6 are the same or different and are a hydrogen atom, a fluorine atom, a halogen atom, cyano group, saturated or unsaturated alkyl group, amino group, cycloalkyl group, heterocycloalkyl group, polycyclic alkyl group, aryl group, heteroaryl group, arylalkyl group, or alkylaryl group, wherein the saturated or unsaturated alkyl group is straight or branched and has 1 to 12 carbon atoms; and

optionally at least one hydrogen atom bonded to the carbon atom of the norbornene monomer according to formula (II) is substituted by a fluorine atom, a halogen atom, cyano group, -R", $-CO_2H$, $-CO_2R"$, $-R"CO_2H$, -COR", -R"CN, $-CONH_2$, -CONHR", $-CONR"_2$, -OCOR", or -OR", wherein the R" is saturated or unsaturated alkyl group having 1 to 12 carbon atoms, thioalkyl group, alkynyloxy group, heterocycloalkyl group, alkoxy group,

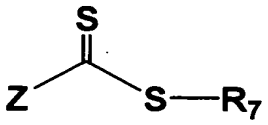
ester group, alkenyl group, alkynylene group, alkenyloxy group, heterocycloalkyl group, aryl group, arylalkyl group, alkylaryl group, heteroaryl group, or combinations thereof, provided that when R" has hydrogen atom bonded to the carbon, optionally at least one hydrogen atom bonded to the carbon atom of R" is substituted by a fluorine atom, or halogen atom.

14. The resin as claimed in claim 11, wherein the initiator is an agent generating free radical species through decomposition.

15. The resin as claimed in claim 11, wherein the initiator is peroxide initiators, azo initiators, or combinations thereof.

16. The resin as claimed in claim 11, wherein the chain transfer reagent is a reversible addition-fragmentation chain transfer reagent.

17. The resin as claimed in claim 11, wherein the chain transfer reagent is a reversible addition-fragmentation chain transfer reagent according to formula (III), of



wherein

Z is a hydrogen atom, a fluorine atom, a halogen atom, cyano group, saturated or unsaturated alkyl

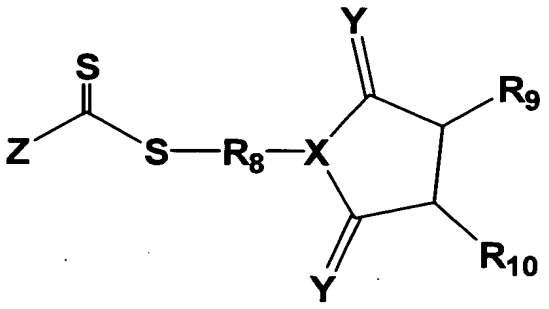
group, amino group, cycloalkyl group, heterocycloalkyl group, polycyclic alkyl group, aryl group, heteroaryl group, arylalkyl group, alkylaryl group, heteroalkylaryl group, $-CO_2H$, $-CO_2R"$, $-R"CO_2H$, $-COR"$, $-CONH_2$, $-CONHR"$, $-CONR"_2$, $-OCOR"$, $-OR"$, $-SR"$, $-NR"_2$, or $-POR"_2$, wherein R" is saturated or unsaturated alkyl group having 1 to 12 carbon atoms, thioalkyl group, alkynyloxy group, heterocycloalkyl group, alkoxy group, ester group, alkenyl group, alkynylene group, alkenyloxy group, heterocycloalkyl group, aryl group, arylalkyl group, alkylaryl group, heteroaryl group, or combinations thereof;

R_7 is a hydrogen atom, a fluorine atom, a halogen atom, cyano group, saturated or unsaturated alkyl group, amino group, cycloalkyl group, heterocycloalkyl group, polycyclic alkyl group, aryl group, heteroaryl group, arylalkyl group, or alkylaryl group, wherein the saturated or unsaturated alkyl group is straight or branched and has 1 to 12 carbon atoms; and

optionally at least one hydrogen atom bonded to the carbon atom of the RAFT reagent according to formula (III) is substituted by a fluorine atom, a halogen atom, cyano group, $-R"$, $-CO_2H$, $-CO_2R"$, $-R"CO_2H$, $-COR"$, $-R"CN$, $-CONH_2$, $-CONHR"$, $-CONR"_2$, $-OCOR"$, or $-OR"$, wherein R" is saturated or unsaturated alkyl group having 1 to 12 carbon atoms, thioalkyl group, alkynyloxy group, heterocycloalkyl group, alkoxy group, ester

group, alkenyl group, alkynylene group, alkenyloxy group, heterocycloalkyl group, aryl group, arylalkyl group, alkylaryl group, heteroaryl group, or combinations thereof, provided that when R" has hydrogen atom bonded to the carbon, optionally at least one hydrogen atom bonded to the carbon atom of R" is substituted by a fluorine atom, or halogen atom.

18. The resin as claimed in claim 11, wherein the chain transfer reagent is a reversible addition-fragmentation chain transfer reagent according to formula (IV), of:



wherein

Z is a hydrogen atom, a fluorine atom, a halogen atom, cyano group, saturated or unsaturated alkyl group, amino group, cycloalkyl group, heterocycloalkyl group, polycyclic alkyl group, aryl group, heteroaryl group, arylalkyl group, alkylaryl group, heteroalkylaryl group, $-CO_2H$, $-CO_2R"$, $-R"CO_2H$, $-COR"$, $-CONH_2$, $-CONHR"$, $-CONR"_2$, $-OCOR"$, $-OR"$, $-SR"$, $-NR"_2$, or $-POR"_2$, wherein R" is saturated or unsaturated alkyl group having 1 to 12 carbon atoms, thioalkyl group, alkynyloxy

group, heterocycloalkyl group, alkoxy group, ester group, alkenyl group, alkynylene group, alkenyloxy group, heterocycloalkyl group, aryl group, arylalkyl group, alkylaryl group,heteroaryl group, or combinations thereof;

R_8 is saturated or unsaturated alkyl group having 1 to 12 carbon atoms, thioalkyl group, alkoxy group, alkenyl group, alkynylene group, alkenyloxy group, alkynyloxy group, or combinations thereof;

R_9 and R_{10} are the same or different and selected from a hydrogen atom, a fluorine atom, a halogen atom, cyano group, saturated or unsaturated alkyl group, amino group, cycloalkyl group, heterocycloalkyl group, polycyclic alkyl group, aryl group, heteroaryl group, arylalkyl group, or alkylaryl group, wherein the saturated or unsaturated alkyl group is straight or branched and has 1 to 12 carbon atoms;

X is N or -CH;

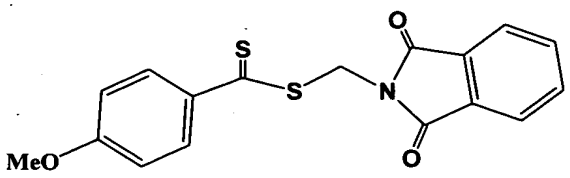
Y is O or S; and

optionally at least one hydrogen atom bonded to the carbon atom of the RAFT reagent according to formula (IV) is substituted by a fluorine atom, a halogen atom, cyano group, -R", $-CO_2H$, $-CO_2R"$, -R"CO_2H, -COR", -R"CN, $-CONH_2$, -CONHR", $-CONR"_2$, -OCOR", or -OR", wherein R" is saturated or unsaturated alkyl group having 1 to 12 carbon atoms, thioalkyl group, alkynyloxy group, heterocycloalkyl group, alkoxy group, ester group, alkenyl group, alkynylene group,

alkenyloxy group, heterocycloalkyl group, aryl group, arylalkyl group, alkylaryl group, heteroaryl group, or combinations thereof, provided that when R" has hydrogen atom bonded to the carbon, optionally at least one hydrogen atom bonded to the carbon atom of R" is substituted by a fluorine atom, or halogen atom.

19. The resin as claimed in claim 18, wherein the R_9 and R_{10} are jointly constructed of cycloalkyl group, heterocycloalkyl group, cycloalkenyl group, arylalkyl group, alkylaryl group, heteroaryl group, or polycyclic alkyl group.

20. The resin as claimed in claim 11, wherein the chain transfer reagent is



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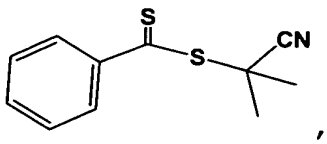

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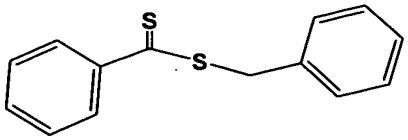

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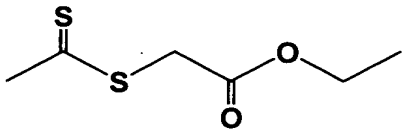


, or combinations thereof,

wherein

optionally at least one hydrogen atom bonded to the carbon atom of the chain transfer reagent is substituted by a fluorine atom, a halogen atom, cyano group, -R", $-CO_2H$, $-CO_2R"$, $-R"CO_2H$, -COR", $-R"CN$, $-CONH_2$, -CONHR", $-CONR"_2$, -OCOR", or -OR", wherein R" is saturated or unsaturated alkyl group having 1 to 12 carbon atoms, thioalky group, alkynyloxy group, heterocycloalkyl group, alkoxy group, ester group, alkenyl group, alkynylene group, alkenyloxy group, heterocycloalkyl group, aryl group, arylalkyl group, alkylaryl group, heteroaryl group, or combinations thereof, provided that when R" has hydrogen atom bonded to the carbon, optionally at least one hydrogen atom bonded to the carbon atom of R" is substituted by a fluorine atom, or halogen atom.

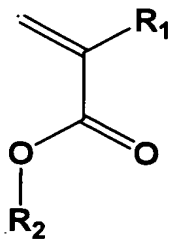
21. The resin as claimed in claim 11, wherein the reaction product has an average molecular weight from 2000 to 30000.

22. A preparation of a resin with lowered PDI, comprising:

reacting at least one reactive monomer, at least one initiator, and at least one chain transfer reagent undergoing polymerization to obtain a resin with lowered PDI,

wherein the reactive monomer comprises acrylate monomer, norbornene monomer, or combinations thereof.

23. The preparation as claimed in claim 22, wherein the acrylate monomer has a formula (I), of.



wherein

R_1 is a hydrogen atom, a fluorine atom, a halogen atom, cyano group, saturated or unsaturated alkyl group, amino group, cycloalkyl group, heterocycloalkyl group, polycyclic alkyl group, aryl group, heteroaryl group, arylalkyl group, or alkylaryl group, wherein the saturated or unsaturated alkyl group is straight or branched and has 1 to 12 carbon atoms;

R_2 is a hydrogen atom, saturated or unsaturated alkyl group, cycloalkyl group, heterocycloalkyl group, polycyclic alkyl group, adamantyl group, aryl group, heteroaryl group, alkylaryl group, or arylalkyl group, wherein the saturated or unsaturated alkyl group is straight or branched and has 1 to 12 carbon atoms; and

optionally at least one hydrogen atom bonded to the carbon atom of the acrylate monomer according to formula (I) is substituted by a fluorine atom, a halogen atom, cyano group, -R", $-CO_2H$, $-CO_2R"$, $-R"CO_2H$, -COR", -R"CN, $-CONH_2$, -CONHR", $-CONR"_2$, -OCOR", or -OR", wherein R" is saturated or

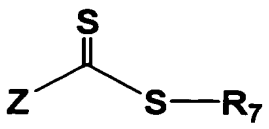
unsaturated alkyl group having 1 to 12 carbon atoms, thioalkyl group, alkynyloxy group, heterocycloalkyl group, alkoxy group, ester group, alkenyl group, alkynylene group, alkenyloxy group, heterocycloalkyl group, aryl group, arylalkyl group, alkylaryl group, heteroaryl group, or combinations thereof, provided that when R" has hydrogen atom bonded to the carbon, optionally at least one hydrogen atom bonded to the carbon atom of R" is substituted by a fluorine atom, or halogen atom.

24. The preparation as claimed in claim 22, wherein the initiator is an agent generating free radical species through decomposition.

25. The preparation as claimed in claim 22, wherein the initiator is peroxide initiator, azo initiators, or combinations thereof.

26. The preparation as claimed in claim 22, wherein the chain transfer reagent is a reversible addition-fragmentation chain transfer reagent.

27. The preparation as claimed in claim 22, wherein the chain transfer reagent is a reversible addition-fragmentation chain transfer reagent according to formula (III), of



wherein

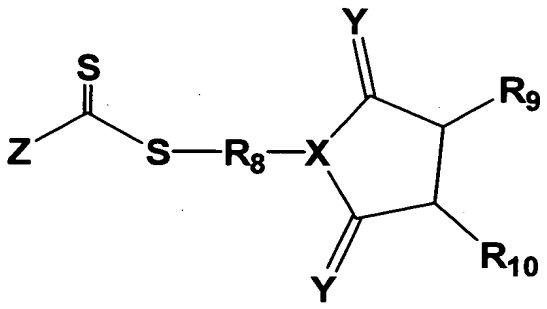
Z is a hydrogen atom, a fluorine atom, a halogen atom, cyano group, saturated or unsaturated alkyl group, amino group, cycloalkyl group, heterocycloalkyl group, polycyclic alkyl group, aryl group, heteroaryl group, alkylaryl group, arylalkyl group, heteroalkylaryl group, $-CO_2H$, $-CO_2R"$, $-R"CO_2H$, -COR", $-CONH_2$, -CONHR", $-CONR"_2$, -OCOR", -OR", -SR" , $-NR"_2$, or $-POR"_2$, wherein R" is saturated or unsaturated alkyl group having 1 to 12 carbon atoms, thioalkyl group, alkynyloxy group, heterocycloalkyl group, alkoxy group, ester group, alkenyl group, alkynylene group, alkenyloxy group, heterocycloalkyl group, aryl group, group,heteroaryl group, arylalkyl group, or combinations thereof;

R_7 is a hydrogen atom, a fluorine atom, a halogen atom, cyano group, saturated or unsaturated alkyl group, amino group, cycloalkyl group, heterocycloalkyl group, polycyclic alkyl group, aryl group, heteroaryl group, alkylaryl group, or arylalkyl group, wherein the saturated or unsaturated alkyl group is straight or branched and has 1 to 12 carbon atoms; and

optionally at least one hydrogen atom bonded to the carbon atom of the RAFT reagent according to formula (III) is substituted by a fluorine atom, a halogen atom, cyano group, -R", $-CO_2H$, $-CO_2R"$, $-R"CO_2H$, -COR", -R"CN, $-CONH_2$, -CONHR", $-CONR"_2$, -OCOR", or -OR", wherein R" is saturated or

unsaturated alkyl group having 1 to 12 carbon atoms, thioalkyl group, alkynyloxy group, heterocycloalkyl group, alkoxy group, ester group, alkenyl group, alkynylene group, alkenyloxy group, heterocycloalkyl group, aryl group, alkylaryl group, heteroaryl group, arylalkyl group, or combinations thereof, provided that when R" has hydrogen atom bonded to the carbon, optionally at least one hydrogen atom bonded to the carbon atom of R" is substituted by a fluorine atom, or halogen atom.

28. The preparation as claimed in claim 22, wherein the chain transfer reagent is a reversible addition-fragmentation chain transfer reagent according to formula (IV), of:



wherein

Z is a hydrogen atom, a fluorine atom, a halogen atom, cyano group, saturated or unsaturated alkyl group, amino group, cycloalkyl group, heterocycloalkyl group, polycyclic alkyl group, aryl group, heteroaryl group, alkylaryl group, arylalkyl group, heteroalkylaryl group, $-CO_2H$, $-CO_2R"$, $-R"CO_2H$, $-COR"$, $-CONH_2$, $-CONHR"$, $-CONR"_2$, -

OCOR", -OR", -SR" , $-NR"_2$, or $-POR"_2$, wherein R" is saturated or unsaturated alkyl group having 1 to 12 carbon atoms, thioalkyl group, alkynyloxy group, heterocycloalkyl group, alkoxy group, ester group, alkenyl group, alkynylene group, alkenyloxy group, heterocycloalkyl group, aryl group, alkylaryl group, heteroaryl group, arylalkyl group, or combinations thereof;

R_8 is saturated or unsaturated alkyl group having 1 to 12 carbon atoms, thioalkyl group, alkoxy group, alkenyl group, alkynylene group, alkenyloxy group, alkynyloxy group, or combinations thereof;

R_9 and R_{10} are the same or different and selected from a hydrogen atom, a fluorine atom, a halogen atom, cyano group, saturated or unsaturated alkyl group, amino group, cycloalkyl group, heterocycloalkyl group, polycyclic alkyl group, aryl group, heteroaryl group, alkylaryl group, or arylalkyl group, wherein the saturated or unsaturated alkyl group is straight or branched and has 1 to 12 carbon atoms;

X is N or -CH;

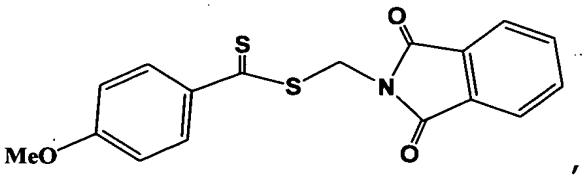
Y is O or S; and

optionally at least one hydrogen atom bonded to the carbon atom of the RAFT reagent according to formula (IV) is substituted by a fluorine atom, a halogen atom, cyano group, -R", $-CO_2H$, $-CO_2R"$, $-R"CO_2H$, -COR", -R"CN, $-CONH_2$, -CONHR", $-CONR"_2$, -OCOR", or -OR", wherein R" is saturated or unsaturated alkyl group having 1 to 12 carbon

atoms, thioalkyl group, alkynyloxy group, heterocycloalkyl group, alkoxy group, ester group, alkenyl group, alkynylene group, alkenyloxy group, heterocycloalkyl group, aryl group, alkylaryl group, heteroaryl group, arylalkyl group, or combinations thereof, provided that when R" has hydrogen atom bonded to the carbon, optionally at least one hydrogen atom bonded to the carbon atom of R" is substituted by a fluorine atom, or halogen atom.

29. The preparation as claimed in claim 28, wherein the R_9 and R_{10} are jointly constructed of cycloalkyl group, heterocycloalkyl group, cycloalkenyl group, alkylaryl group, arylalkyl group, heteroaryl group, or polycyclic alkyl group.

30. The preparation as claimed in claim 22, wherein the chain transfer reagent is



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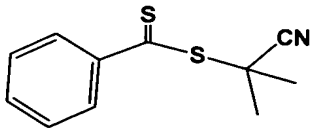

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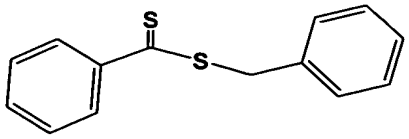

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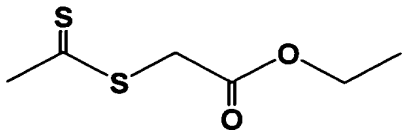

, or combinations thereof,

wherein

optionally at least one hydrogen atom bonded to the carbon atom of the chain transfer reagent is substituted by a fluorine atom, a halogen atom, cyano group, -R", $-CO_2H$, $-CO_2R"$, $-R"CO_2H$, -COR", -R"CN, $-CONH_2$, -CONHR", $-CONR"_2$, -OCOR", or -OR", wherein R" is saturated or unsaturated alkyl group having 1 to 12 carbon atoms, thioalkyl group, alkynyloxy group, heterocycloalkyl group, alkoxy group, ester group, alkenyl group, alkynylene group, alkenyloxy group, heterocycloalkyl group, aryl group, alkylaryl group, heteroaryl group, arylalkyl group, or combinations thereof, provided that when R" has hydrogen atom bonded to the carbon, optionally at least one hydrogen atom bonded to the carbon atom of R" is substituted by a fluorine atom, or halogen atom.

31. The preparation as claimed in claim 22, wherein the reaction product has an average molecular weight from 2000 to 30000.